

CLAIMS

What is claimed is:

1. A guiding catheter used for locating a patient's circulatory structure,
5 comprising:
a flexible shaft having an open lumen dimensioned for receiving a payload;
a Doppler sensor arrangement disposed at a distal end of the flexible shaft
and configured for sensing blood flow velocity within the patient's circulatory structure
accessed by the distal end of the flexible shaft, the Doppler sensor arrangement
10 producing blood flow velocity signals; and
a detector communicatively coupled to the Doppler sensor arrangement, the
detector configured to detect changes in blood flow turbulence using the blood flow
velocity signals, wherein a detected change in blood flow turbulence is indicative of a
relative change in position of the flexible shaft's distal end between cardiac vessel
15 and cardiac chamber locations.
2. The guiding catheter according to claim 1, wherein the detector is
configured to detect a transition between relatively turbulent blood flow and relatively
laminar blood flow using the blood flow velocity signals.
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3. The guiding catheter according to claim 1, wherein the Doppler sensor
arrangement is configured to sense at least a lateral blood flow velocity component.
4. The guiding catheter according to claim 1, wherein the Doppler sensor
25 arrangement is configured to sense a lateral blood flow velocity component and an
axial blood flow velocity component.

5. The guiding catheter according to claim 4, wherein the detector is configured to perform a comparison of the lateral and axial blood flow velocity turbulence components to detect the blood flow turbulence change.

5 6. The guiding catheter according to claim 1, wherein the Doppler sensor arrangement comprises an emitter and a receiver, each of the emitter and receiver comprising an ultrasonic piezoelectric crystal.

10 7. The guiding catheter according to claim 1, wherein the Doppler sensor arrangement comprises an emitter and a receiver, the emitter comprising a laser light source and the receiver comprising an optical detector.

15 8. The guiding catheter according to claim 1, wherein the open lumen is dimensioned to receive a pacing or defibrillation lead.

9. The guiding catheter according to claim 1, wherein the Doppler sensor arrangement is configured for continuous wave Doppler sensing.

20 10. The guiding catheter according to claim 1, wherein the Doppler sensor arrangement is configured for pulsed Doppler sensing.

11. A method for locating a destination blood vessel, comprising:
providing a guiding catheter comprising a flexible shaft having an open lumen dimensioned to receive a payload and a Doppler sensor arrangement disposed at a
25 distal end of the flexible shaft;
distally advancing the guiding catheter through a circulatory pathway which includes at least a portion of a heart chamber;

sensing blood flow velocity components using the Doppler sensor arrangement;

detecting changes in blood flow turbulence based on the sensed blood flow velocity components; and

- 5 detecting a relative change in position of the flexible shaft's distal end between destination blood vessel and heart chamber locations based at least in part on the detected changes in blood flow turbulence.

10 12. The method according to claim 11, wherein detecting the relative position change comprises detecting a transition between relatively turbulent blood flow and relatively laminar blood flow using the sensed blood flow velocity components.

15 13. The method according to claim 11, wherein sensing the blood flow velocity components comprises sensing lateral blood flow velocity components.

14. The method according to claim 11, wherein sensing the blood flow velocity components comprises sensing axial blood flow velocity components.

20 15. The method according to claim 11, wherein sensing the blood flow velocity components comprises sensing lateral and axial blood flow velocity components.

25 16. The method according to claim 11, wherein sensing the blood flow velocity components comprises measuring a frequency response of the blood flow velocity components.

17. The method according to claim 11, further comprising producing an audio signal that varies in relation to the detected changes in blood flow turbulence.

5 18. A system for locating a destination blood vessel, comprising:
a guiding catheter comprising a flexible shaft having an open lumen dimensioned to receive a payload;
means for sensing blood flow velocity components using Doppler sensing;
means for detecting changes in blood flow turbulence based on the sensed blood flow velocities; and
10 means for detecting a relative change in position of the flexible shaft's distal end between destination blood vessel and heart chamber locations based at least in part on the detected changes in blood flow turbulence.

15 19. The system of claim 18, comprising means for producing an audio signal that varies in relation to the detected changes in blood flow turbulence.

20. The system of claim 18, comprising means for detecting a transition between relatively turbulent blood flow and relatively laminar blood flow using the sensed blood flow velocity components.